

CLAIMS:

1. A woodworking machine comprising:

a conductive cutter adapted to cut a workpiece;

5 a motor adapted to drive the cutter;

a contact detection system electrically coupled to the cutter to impart an electrical signal thereto, where the electrical signal has at least one property, and where the at least one property is changed when a person contacts the cutter, and where the contact detection system is adapted to distinguish contact between the cutter and the person from at least one other event generating a comparable amount of change in the at least one property based on the time during which the change in the at least one property occurs; and

a reaction system adapted to cause a predetermined action to take place upon detection of contact between the person and the cutter by the contact detection system.

2. The machine of claim 1, where the at least one property is the voltage amplitude of the electrical signal.

3. The machine of claim 2, where the contact detection system is adapted to identify contact between a person and the cutter as a reduction in the voltage amplitude of the signal on the cutter of at least 5% within 100 microseconds.

4. The machine of claim 1, where the contact detection system is adapted to detect contact between the cutter and the person based on at least one change in the at least one property that occurs in less than one millisecond.

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5. The machine of claim 1, where the contact detection system is adapted to detect contact between the cutter and the person based on at least one change in the at least one property that occurs in less than one hundred microseconds.

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6. The machine of claim 1, where the at least one other event is contact between the cutter and green wood.

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7. The machine of claim 1, where the predetermined action includes stopping movement of the cutter.

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8. The machine of claim 7, where the reaction system is configured to stop movement of the cutter within 10 milliseconds after contact between the cutter and the person.

9. A woodworking machine adapted to process a workpiece, where the woodworking machine has a location potentially dangerous to a person, the machine comprising:

an electrically conductive sensor positioned at the potentially dangerous location in the machine; and

5 a contact detection system operably connected to the sensor to receive a signal therefrom, where the signal changes upon contact between the sensor and a person and upon contact between the sensor and the workpiece, and where the contact detection system is configured to differentiate contact with the person from contact with the workpiece based on the rate at which the signal changes.

10. The woodworking machine of claim 9, where the signal received from the sensor is an electrical signal having a voltage amplitude, and where the contact detection system is configured to differentiate contact between the sensor and the person from contact between the sensor and the workpiece based on the rate at which the voltage amplitude of the signal changes.

11. The woodworking machine of claim 10, where the contact detection system is configured to identify a predetermined change in the voltage amplitude that occurs in less than 1
20 millisecond as resulting from contact between the sensor and the person rather than contact between the sensor and the workpiece.

12. The machine of claim 11, where the contact detection system is configured to identify a change in the voltage amplitude of at least 5% in less than 1 millisecond as resulting from contact between the sensor and the person rather than contact between the sensor and the workpiece.

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13. The machine of claim 10, where the contact detection system is configured to identify a predetermined change in the voltage amplitude that occurs in less than 100 microseconds as resulting from contact between the sensor and the person rather than contact between the sensor and the workpiece.

14. The machine of claim 13, where the contact detection system is configured to identify a change in the voltage amplitude of at least 5% in less than 100 microseconds as resulting from contact between the sensor and the person rather than contact between the sensor and the workpiece.

15. The machine of claim 10, where the contact detection system is configured to identify a change in the voltage amplitude of less than 10% over a time period of at least 1 millisecond as resulting from contact between the sensor and the workpiece rather than contact between the sensor and the person.

16. The machine of claim 9, where the sensor takes the form of a movable cutting tool adapted to cut the workpiece.

5 17. A woodworking machine comprising:
a cutter adapted to cut a workpiece; and
a contact detection system adapted to detect contact between a person and the cutter, the contact detection system including:

10 an excitation system adapted to supply an electrical signal having a first amplitude and period, the electrical signal being coupled to the cutter to induce a corresponding electrical signal of a second amplitude on the cutter, and

15 a sensing system adapted to sense the second electrical signal induced onto the cutter, where the sensing system is adapted to detect contact between a person and the cutter based on a change in the sensed second electrical signal over a detection period, where the detection period is between 5 and 150 microseconds and at least twice the period of the first electrical signal.

20 18. The machine of claim 17, wherein the excitation system is adapted to adjust the first amplitude based on the properties of the second electrical signal sensed by the sensing system.

19. The machine of claim 18, wherein the excitation system is adapted to adjust the first amplitude to attempt to maintain the amplitude of the second electrical signal sensed by the sensing system at a predetermined level.

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20. The machine of claim 18, wherein the excitation system is adapted to adjust the first amplitude at an adjustment rate of less than 10% per millisecond.

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21. The machine of claim 18, where the sensing system is adapted to detect contact between a person and the cutter when the amplitude of the second electrical signal sensed by the sensing system drops below the predetermined level by a specified amount.

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22. A woodworking machine comprising:

a support structure;

a motor supported by the support structure;

a blade assembly including a blade with cutting teeth, where the blade assembly is supported by the support structure and moveable by the motor, and where the blade assembly is electrically isolated from the support structure;

a contact detection system to detect contact between the blade assembly and a person, where the contact detection system includes:

an electrode adjacent the blade assembly to create a capacitive coupling to the blade assembly, where the blade assembly has an apparent capacitance, and

circuitry adapted to detect a pre-selected increase in the apparent capacitance of the blade assembly, where the pre-selected increase in the apparent capacitance of the blade assembly is selected to correspond to the pre-selected increase in the apparent capacitance resulting from conductively coupling a person to the blade assembly so that the pre-selected increase in the apparent capacitance represents contact between the blade assembly and the person;

a brake mechanism adapted to stop the blade by moving into contact with the teeth of the blade upon detection of the pre-selected increase in the apparent capacitance of the blade assembly.

23. The machine of claim 22, where the circuitry is adapted to compensate for any increase in the apparent capacitance of the blade assembly due to contact between the blade and green wood.

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24. For use in connection with a woodworking machine having a motor-driven cutting tool, a method of detecting contact between a person and the cutting tool, the method comprising:

imparting an electrical signal onto the cutting tool, where the electrical signal has an alternating voltage amplitude defining plural voltage peaks;

sensing the electrical signal imparted onto the cutting tool; and

detecting contact between a person and the cutting tool by detecting that a predetermined plural number of the voltage peaks of the sensed electrical signal have amplitudes outside a specified range of amplitudes.

25. A woodworking machine having a cutting tool adapted to cut workpieces, the machine comprising:

means for driving the cutting tool;

means for detecting contact between a person and the cutting tool;

5 means for distinguishing contact between a person and the cutting tool from contact between green wood and the cutting tool; and

means for stopping movement of the cutting tool upon detection of contact between the person and the cutting tool.